

## **Comparing Earnings Outcome Differences Between All Graduates and Title IV Graduates**

**by**

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## Abstract

Recently, two public data products have been released that publish earnings outcomes for college graduates by program of study and institution: Post-Secondary Employment Outcomes and College Scorecard, from the Census Bureau and U.S. Department of Education, respectively. While the earnings data underlying the data products is similar, persons eligible for the frames of the two products is different, with College Scorecard restricted to only students that receive Title IV aid. This paper documents how these differences in the population studied affect the published earnings outcomes. I show that at an institution, of the institutions in my sample, an average of sixty percent of baccalaureate graduates receive Title IV aid, and that the lower the coverage, the larger the difference in earnings measurement. Additionally, I show that short-run earnings outcomes are very similar for these two samples, while longer-run outcomes (10 years after graduation) are significantly lower for the Title IV population. I also show that program ranking can change significantly when considering the Title IV population rather than the entire graduate population.

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Information on employment outcomes of college attendance and graduation is in high demand from students, parents, and administrators. Policymakers want to ensure that public investment in higher education is worth the cost, while students and parents want to be informed on the expected outcomes from different colleges and field choices, and how expected earnings compare with decisions over student debt load.

A number of efforts have been undertaken by federal and state governments to provide information on employment outcomes of college students. States have linked unemployment insurance wage records to graduate records, and published earnings outcomes on public-facing websites at the program (institution by field) level.<sup>2</sup> The federal government has provided this information in two ways. First, in 2014 the Department of Education under the Obama Administration released College Scorecard, which published earnings outcomes for first-time students attending an institution who received Title IV financial aid. The Department of Education also recently published one- and two-year postgraduate earnings at the program level for graduates who received Title IV aid, the most recent data release in December 2020.

A related effort was undertaken at the Census Bureau starting in 2017, now referred to as the Post-Secondary Employment Outcomes (PSEO). PSEO is an experimental data product at Census, and publishes earnings outcomes for *all* graduates by institution, degree type, and degree field.<sup>3</sup> The important distinction between College Scorecard and PSEO is that the sample frame of PSEO is more expansive, including all graduates rather than just graduates receiving Title IV aid. At the current time, PSEO also is able to release long-run earnings outcomes (10 years after graduation), while College Scorecard is only able to release one- and two-year earnings outcomes due to data availability.

While College Scorecard and PSEO are conceptually similar, the implementation and data scope are very different. Because College Scorecard's primary purpose is transparency, schools do not voluntarily provide graduate data to the Education Department. The data source for the College Scorecard is the National Student Loan Data System, which only includes data on students who received Title IV aid. These data contrast with the data available to Census for PSEO, which is voluntarily provided, and includes all graduates from an institution.

Additionally, College Scorecard and PSEO have different restrictions on who is eligible to be counted in the earnings tabulations. College Scorecard drops individuals who have zero earnings in a reference year, are enrolled in another program in the reference year, died in the reference year, or received a higher degree in or before the reference year. While PSEO covers all award recipients, individuals are dropped from the calculations if they do not have positive earnings for at least three quarters in the reference year, or if they do not earn at least the full-time equivalent of the federal minimum wage in the reference year.

The purpose of this paper is to focus on one specific sample difference between PSEO and College Scorecard, the restriction to those receiving Title IV aid, and the earnings outcomes for those sets of graduates. While this does not directly compare College Scorecard and PSEO, because of the

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<sup>2</sup> Examples of states that have done this are Colorado, Texas, and North Carolina, among others.

<sup>3</sup> The other difference between these two data products is that College Scorecard uses tax data as the earnings source, which covers nearly all jobs, while PSEO uses LEHD wage records, which covers about 96% of all private sector jobs, but misses the self-employed, postal service, active military, and other job categories. (Abowd et al. 2009)

reasons outlined above, it helps users have a sense for how the coverage differences explain differences in published earnings outcomes. To compare the earnings outcomes, I compare earnings for all graduates and Title IV graduates. I focus on three main differences between the two measures. First, I show that for the institutions in my sample, Title IV graduates only comprise approximately 60% of graduates from a program. Second, I show that first-year earnings measures are comparable between the two samples, despite the coverage differences. 10 years after graduation, earnings diverge significantly for those cells with fewer Title IV graduates, which suggest different earnings trajectories for these students. Finally, I show that these differences in earnings measurement affect rankings of programs, such that for a given percentile ranking of a program using College Scorecard data, the true ranking may be 10 percentile points higher or lower.

The remainder of this paper proceeds as follows. The next section discusses the data I use for the project, and also our methodology for measuring earnings. Section 2 discusses comparisons of earnings outcomes, and provides a number of graphs to illustrate the differences, while Section 3 discusses the effect these differences have on rankings of institutions and programs. Section 4 concludes.

## **I. Data and Methodology**

As part of the PSEO data product, institutions and state higher education systems provide Census with data on graduates, enrolled students, and a number of other characteristics, including financial aid activity by academic year.<sup>4</sup> Using this information, I can construct two samples of graduates: all graduates, and graduates who receive Title IV aid.<sup>5</sup> For both samples, I apply the earnings restrictions used by PSEO, which are described in the introduction.

To measure earnings outcomes, I use national Unemployment Insurance wage records, which are obtained through the Local Employment Dynamics Partnership. These wage records are different from the earnings records used in the actual production of College Scorecard, which are from tax records held by the IRS. While this difference will cause the earnings measurements to be different from College Scorecard's published numbers, that is outside the scope of our paper, since our focus is on how the difference in the sample of graduates affects the earnings outcomes.<sup>6</sup>

To compare earnings outcomes between these two samples, I construct median earnings at the institution and degree field (4 digit CIP) level. I focus on baccalaureate degrees, since much of the attention is on those degrees. I restrict our sample of graduates to those graduating from 2001 to 2006, so that I have 10 year earnings outcomes for all graduates. This allows me to compare earnings outcomes and earnings growth over time.

Table 1 shows the average earnings of our sample. The first column is the entire population of graduates in our sample, and the second column shows earnings outcomes and sample sizes for the restricted sample of Title IV aid recipients.

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<sup>4</sup> Institutions that provide Financial Aid data are State University of New York, City University of New York, Colorado Department of Higher Education, and University of Texas System.

<sup>5</sup> Title IV financial aid includes Perkins Loans, Federal Subsidized or Unsubsidized Loans, and Pell Grants.

<sup>6</sup> For those interested in a fuller description of the differences, the 2015 Technical Paper from College Scorecard outlines some differences in earnings outcomes from UI and IRS sources:  
<https://collegescorecard.ed.gov/assets/UsingFederalDataToMeasureAndImprovePerformance.pdf>

**Table 1: Summary Statistics**

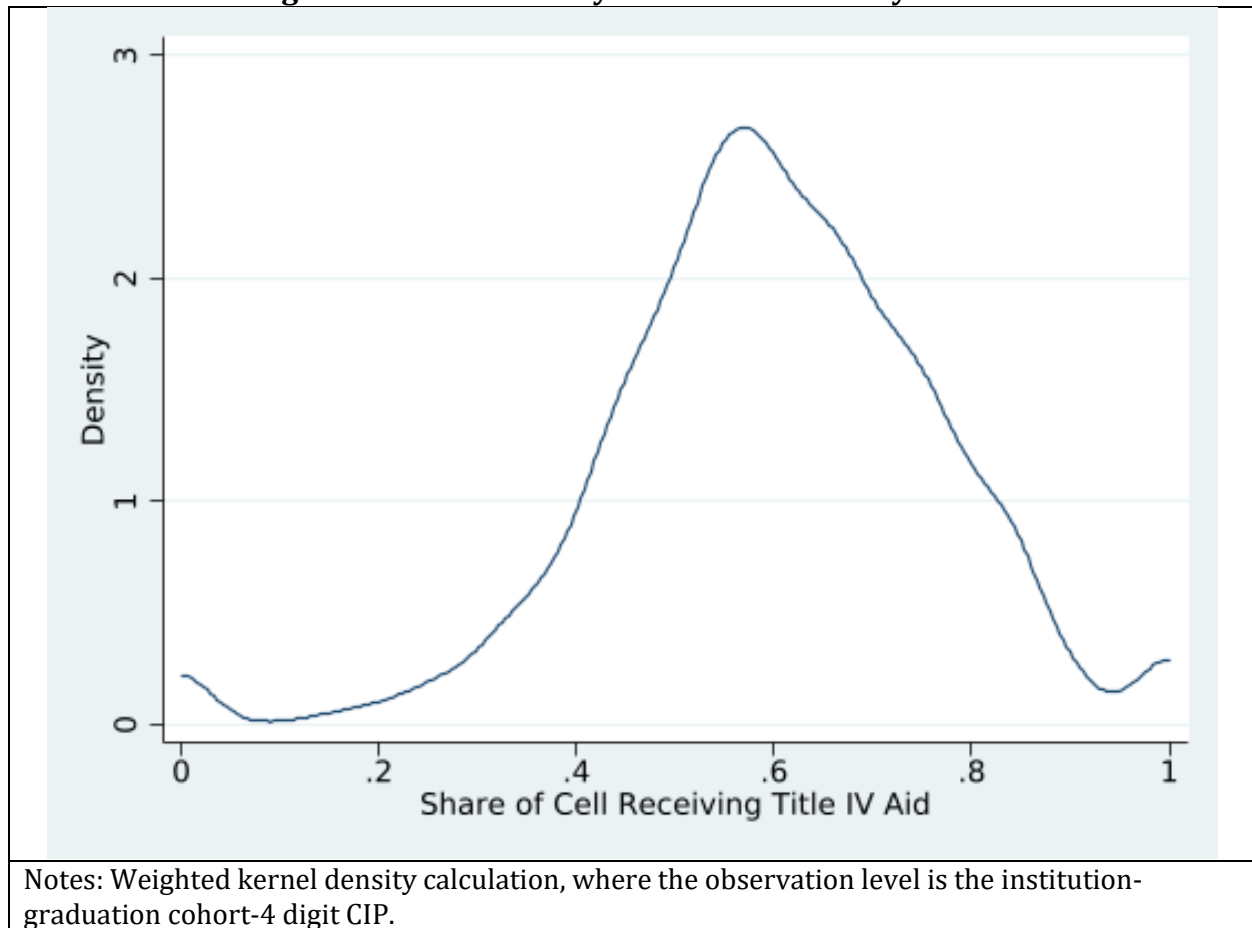
	All Graduates	Title IV Graduates
50th Percentile Earnings		
1 year post-graduation	29960	29840
10 year post-graduation	56940	54580
Observation Count		
1 year post-graduation	624000	389000
10 year post-graduation	198000	112000

Notes: Author's calculation based on matched sample for graduates 2001-2006. Observation counts rounded. All Graduates includes all graduates in sample, while Title IV Graduates includes only graduates who received Title IV federal aid.

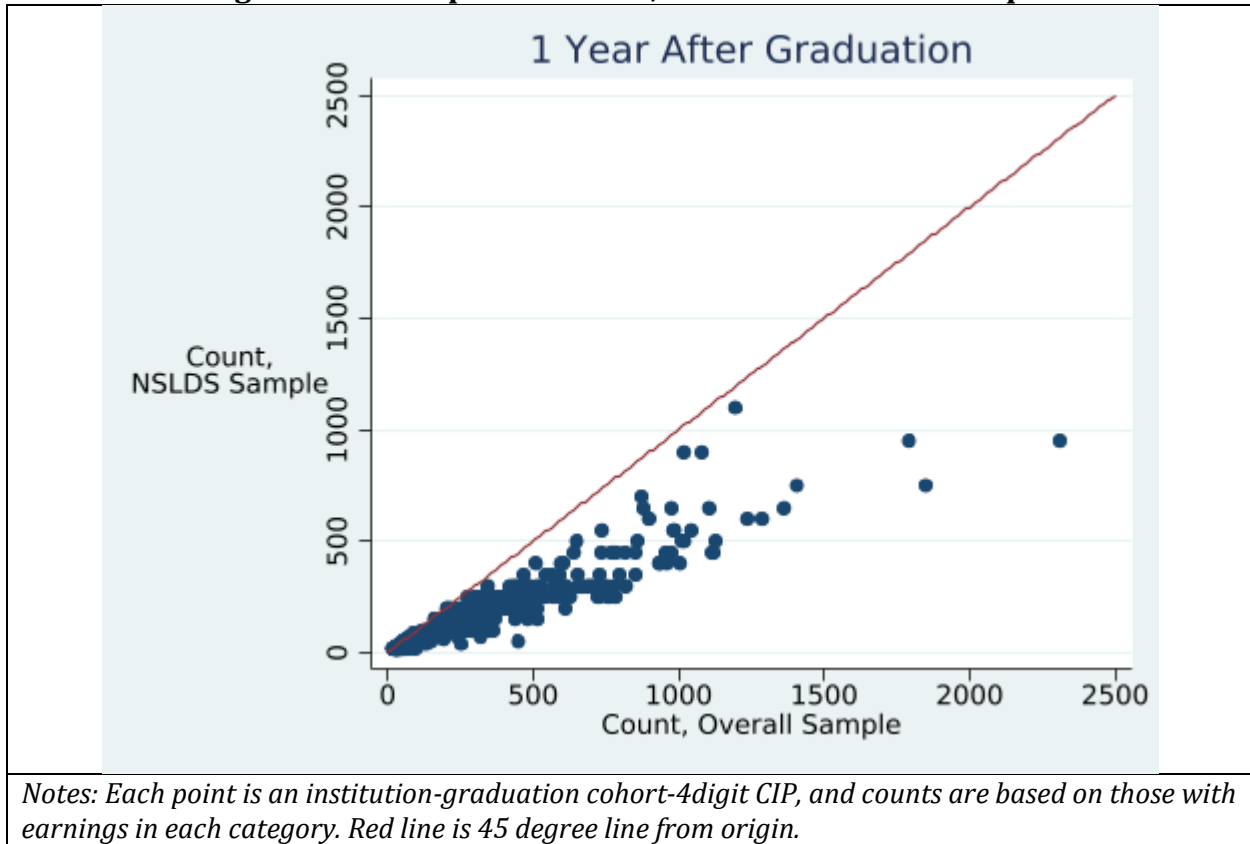
## **II. Results of Comparison**

The first comparison is the share of the total count of graduates receive Title IV financial aid. If the counts are very similar, the earnings measures are unlikely to be different. To measure the difference in coverage, I calculate the share of graduates receiving Title IV aid, where the denominator is the total count of graduates in an institution-cohort-degree level-degree field cell. I show the distribution of these shares at the program (institution x field) level in Figure 1. While some of the programs have a large share of their graduates receiving Title IV aid, there are a lot of programs that have less than 40 percent of their students receiving Title IV aid. I also show Figure 2, which is a scatterplot of the counts, and includes a 45 degree line for reference.

**Figure 1: Kernel Density of Share Covered by NSLDS**



**Figure 2: Scatterplot of Counts, Overall and NSLDS Sample**



However, these coverage issues will only matter to the extent that Title IV recipients have different earnings outcomes post-graduation compared with non-Title IV graduates. To measure the difference in earnings outcomes, I calculate the 50<sup>th</sup> percentile of the earnings distribution for the Overall and NSLDS samples, then measure the percent difference of this measure for each program.<sup>7</sup> For example, a program with a percent difference of 20% implies that the median earnings earnings of all graduates is 20% higher than the Title IV graduates.

To see how our measure of error lines up with share of Title IV aid recipients, Figure 3 shows a scatterplot where the X-axis is share NSLDS, and the Y-axis is percent difference in the 50<sup>th</sup> percentile of earnings measure, for 1 year (left panel) and 10 years (right panel) after graduation. In the lower panels of Figure 3, I summarize the scatterplots by collapsing them into deciles, and plotting the average and 90<sup>th</sup> and 10<sup>th</sup> percentiles. These figures make it clear that in the first year after graduation, College Scorecard earnings are very close to the overall sample, and if anything may overstate earnings for some groups. However, 10 years after graduation, all deciles show that College Scorecard earnings is understating earnings outcomes for graduates, and the problem is worse for the lowest deciles (i.e. those with the least coverage of graduates).

<sup>7</sup> More technically, in the following graphs, I display the relative error (from Davis, Haltiwanger & Schuh, 1996), which is  $\frac{PCT\_ALL - PCT\_FA}{(PCT\_ALL + PCT\_FA)/2}$ , where  $PCT\_FA$  and  $PCT\_ALL$  are the 50<sup>th</sup> percentile of earnings for those receiving financial aid and all graduates, respectively.

**Figure 3: Scatterplot of DHS Errors of 50<sup>th</sup> Percentile Earnings, by Share Receiving Title IV Aid**

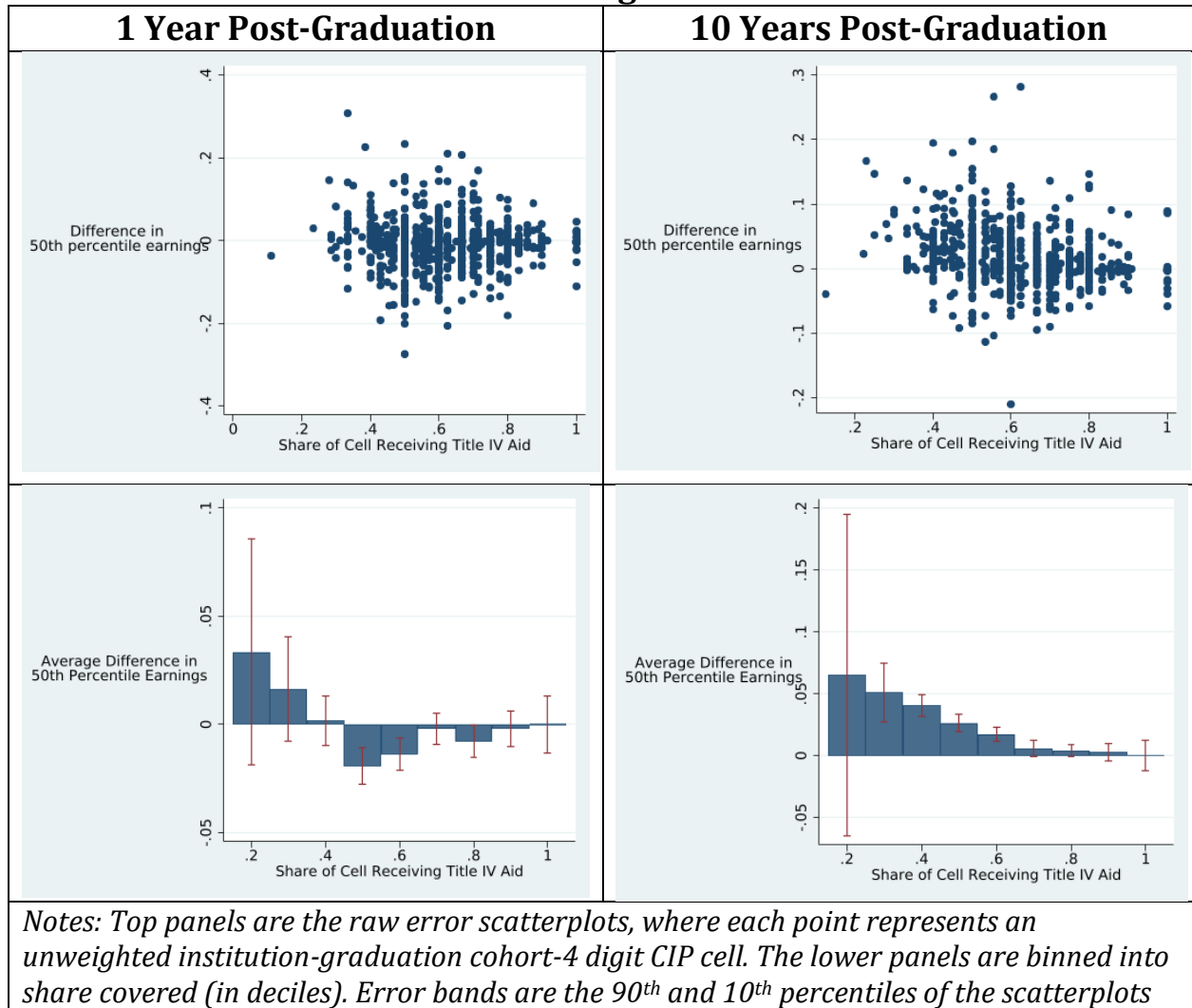
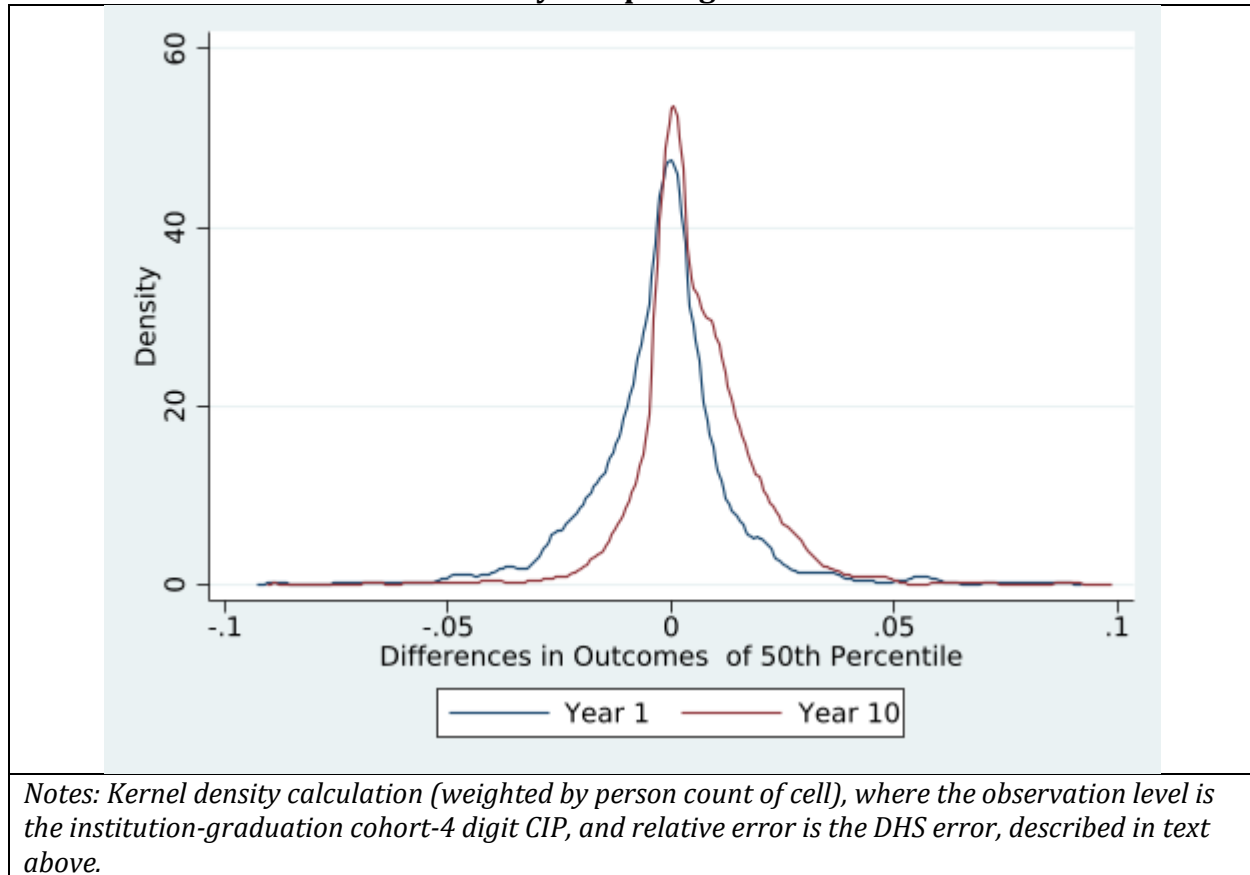


Figure 3 shows that while the initial differences in earnings are close to zero, over time the Title IV sample becomes less representative of earnings outcomes for all graduates. Another way to visualize this is to plot the kernel densities of the errors, to see where in the distribution the change is coming from, which is what Figure 4 does below. Clearly, there is a large rightward shift in the distribution, which means that earnings outcomes from the Title IV sample underestimates earnings outcomes across the distribution.



**Figure 4: Distribution of DHS Error for 50<sup>th</sup> Percentile Earnings, 1 and 10 years post-graduation**



### Distributional Differences in Outcomes

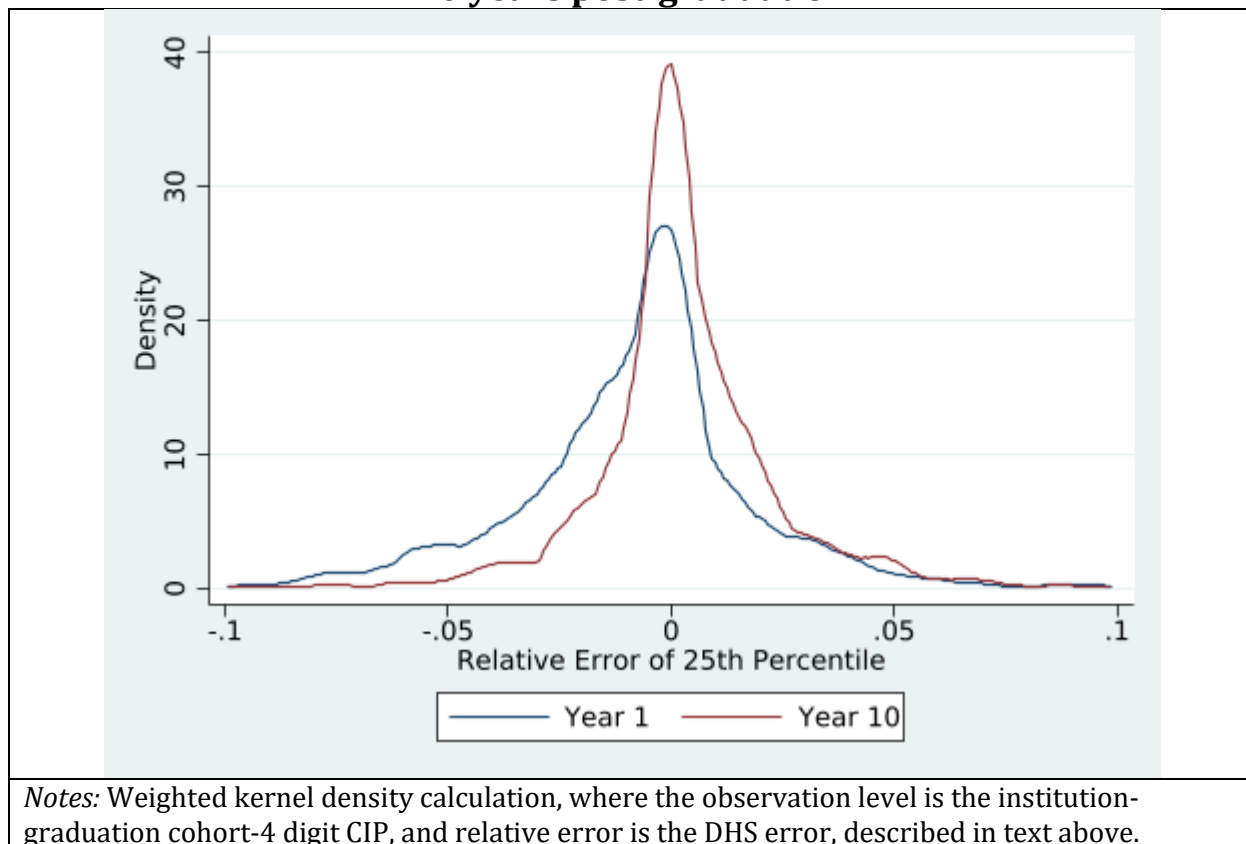
College Scorecard currently only publishes median earnings outcomes for graduates, so I have thus far focused on that moment in the distribution. In this subsection, I measure other moments of the distribution. To that end, in this short section, I replicate Figures 3 and 4 for the 25<sup>th</sup> and 75<sup>th</sup> percentiles, which are also published in the PSEO data product, because it sheds light on whether publishing additional moments of the distribution would be advisable for College Scorecard.

What the figures below show (Figures 5-8) is that the mismeasurement issues are even worse at the tails of the distribution. While there is minimal bias for the 25<sup>th</sup> percentile of earnings (and if anything, for the first year after graduation, Title IV outcomes over-estimate earnings, as shown in Figure 5 Panel C), the difference in the 75<sup>th</sup> percentile of earnings is substantial, especially for longer-run earnings outcomes. Figure 7 Panel D shows that at all levels of coverage shares, the bias is positive and much larger than the bias at the 50<sup>th</sup> percentile, which suggests that graduates that enter high-earning careers are disproportionately taken by individuals who did not receive Title IV aid. For those programs in the lowest decile of earnings, 10 year earnings are 20% lower for the Title IV sample compare to the sample of all graduates, while programs at the median of coverage (60% of graduates covered), the Title IV sample understates earnings by 5%, still a substantial difference. While the other moments showed no systematic bias in the first year after graduation, Figures 7 and 8 show that there is bias for the 75<sup>th</sup> percentile even one year after graduation.

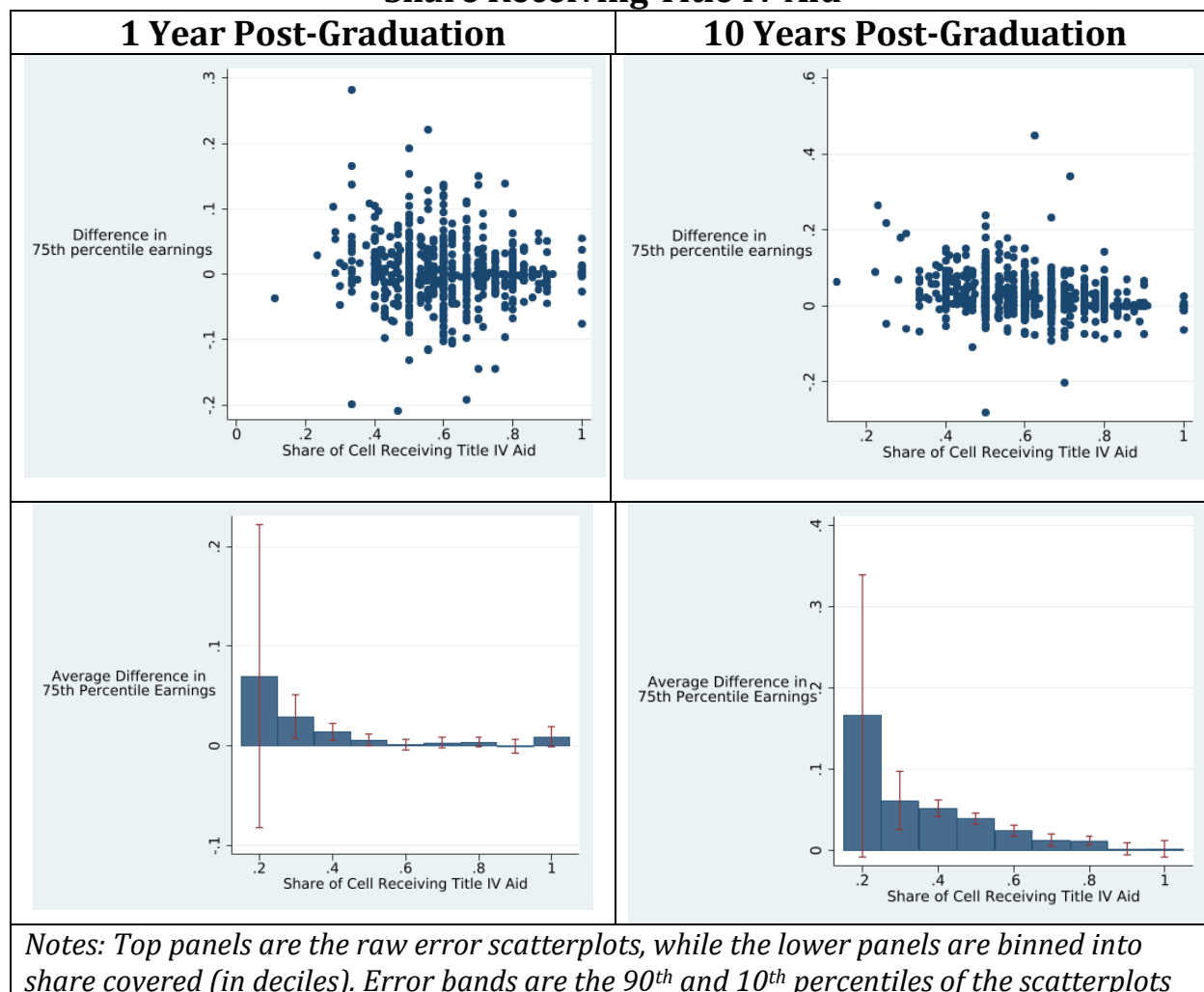
**Figure 5: Scatterplot of DHS Errors of 25<sup>th</sup> Percentile Earnings, by Share Receiving Title IV Aid**



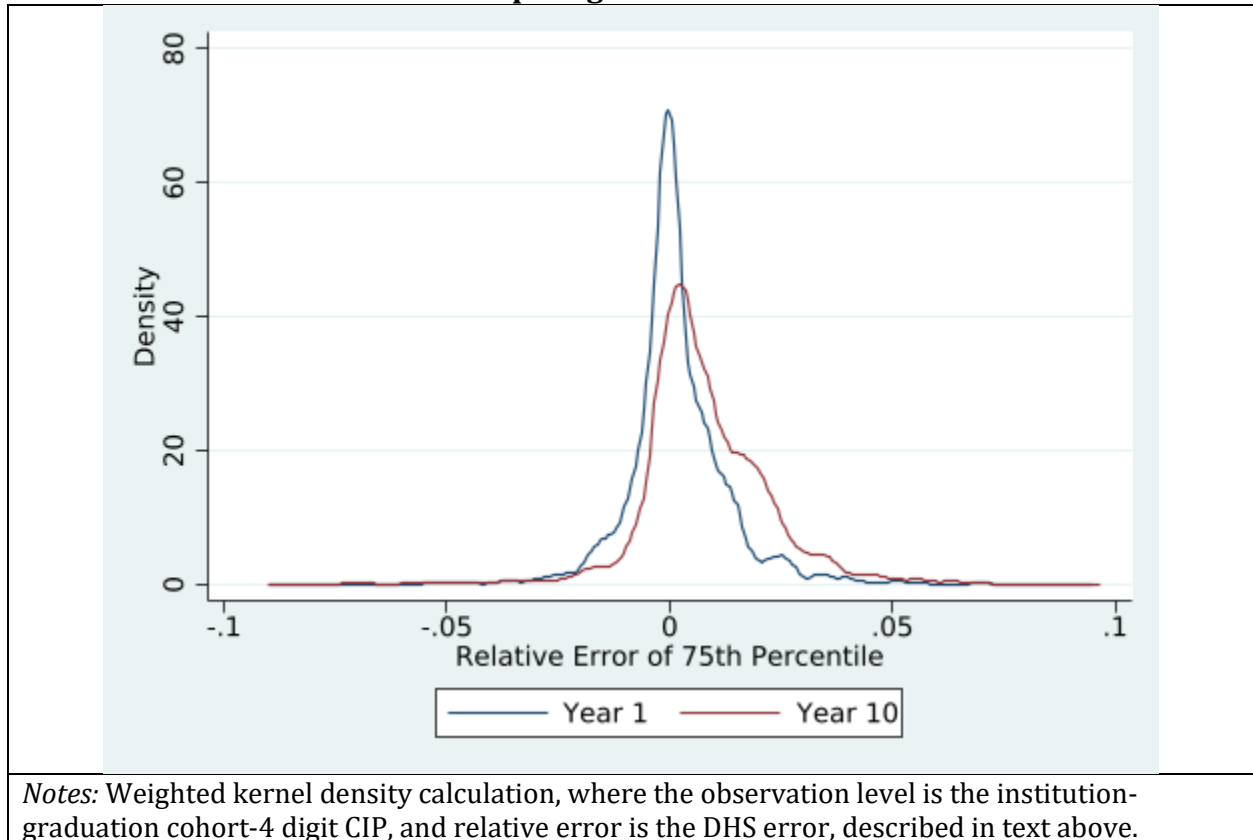
**Figure 6: Distribution of DHS Error for 25<sup>th</sup> Percentile Earnings, 1 and 10 years post-graduation**



**Figure 7: Scatterplot of DHS Errors of 75<sup>th</sup> Percentile Earnings, by Share Receiving Title IV Aid**



**Figure 8: Distribution of DHS Error for 75<sup>th</sup> Percentile Earnings, 1 and 10 years post-graduation**

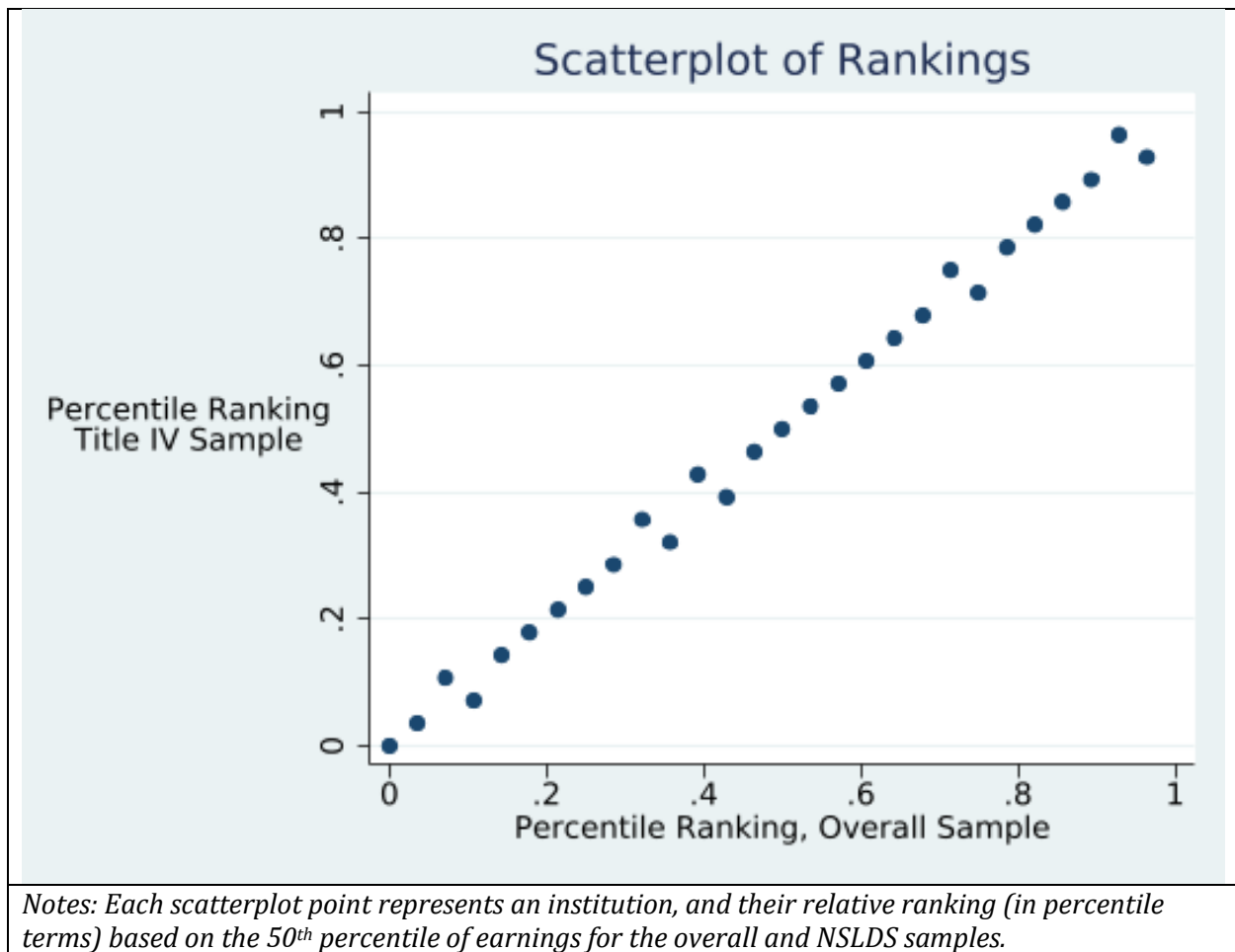


### III. Effect on Rankings

While not an intended purpose of College Scorecard, news outlets use the College Scorecard data to rank schools and programs.<sup>8</sup> In this section, I show how differences in the sample (Title IV versus all graduates) causes changes in these rankings.

To measure the effect of these differences, I consider three possible rankings, which I show for the Title IV and Overall samples. First, the rank of schools across all fields based on median income in the first year post-graduation, which is Figure 5. It appears from this graph that the Title IV sample does a good job capturing the rank of schools compared to one another.

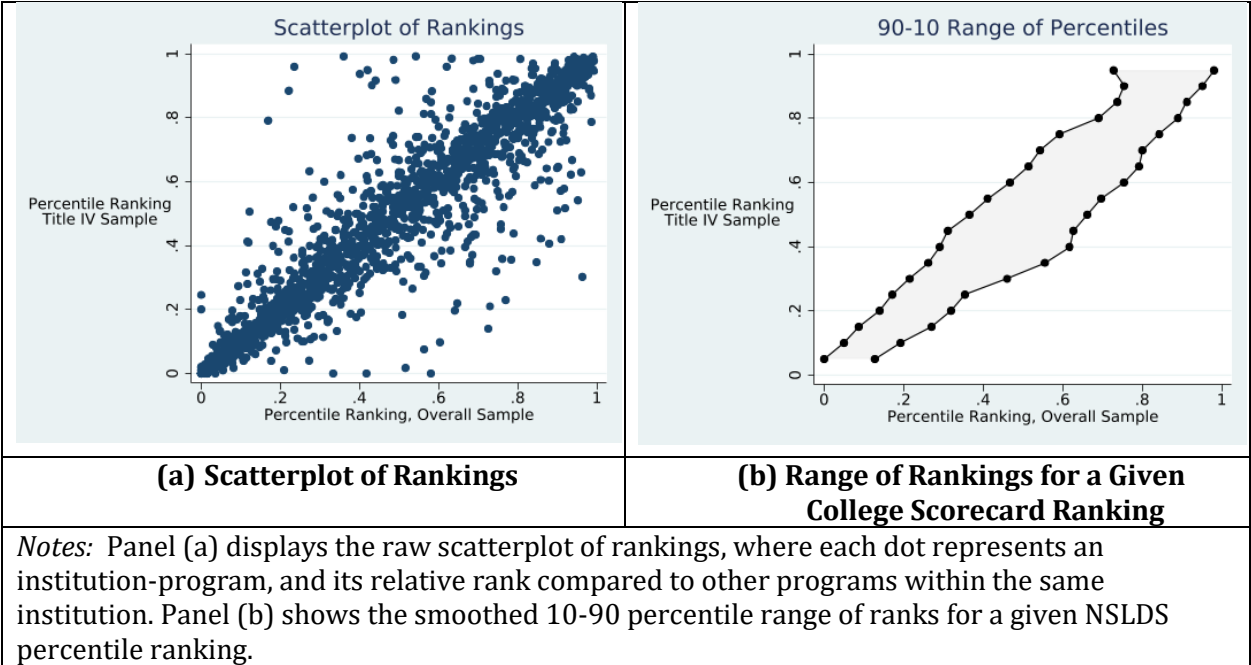
**Figure 9: Comparison of Institution Rankings from Overall and NSLDS Samples**



<sup>8</sup> Optimal recently launched a website (GradReports.com) which specifically ranks schools by field of study outcomes from College Scorecard

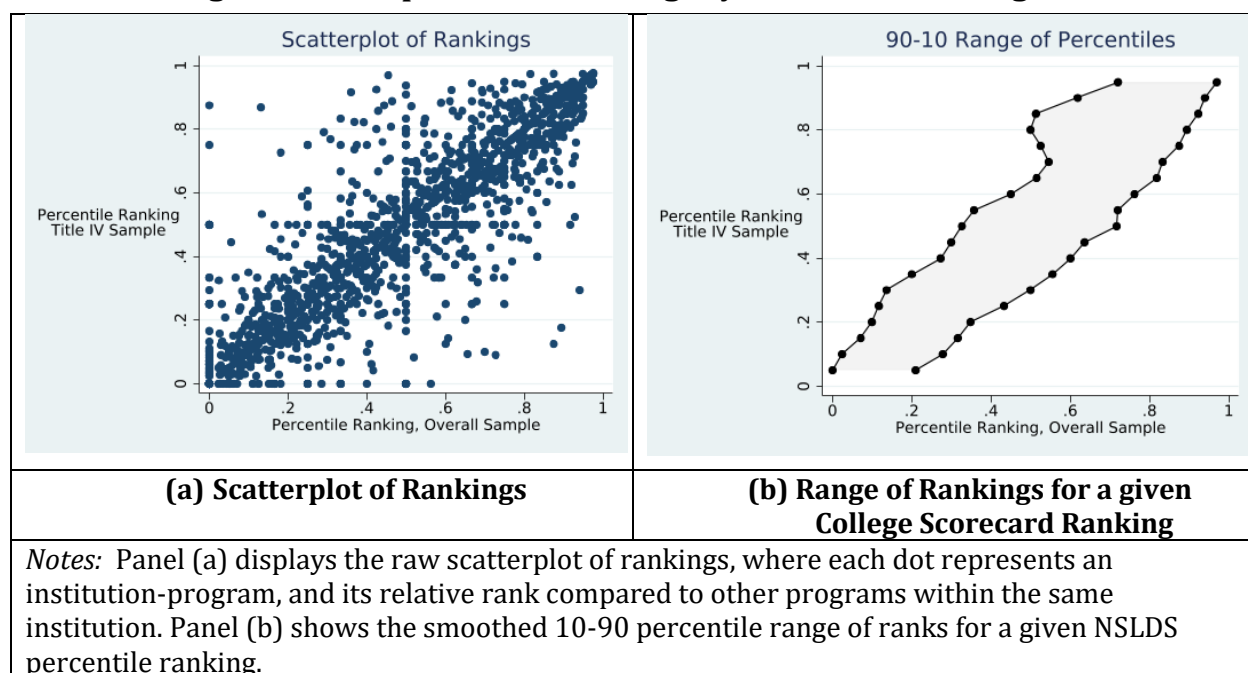
Second, I consider the rank of fields within a school (in percentile terms), which I show in Figure 6. The scatterplot in Panel A shows that while most points are close to the 45 degree line, there is wide variability around that, such that the rankings using NSLDS do not capture the true rank for a number of programs. To capture the variability of these rankings, in Panel B I plot smoothed 90<sup>th</sup> and 10<sup>th</sup> percentile ranking values for the overall sample, for a given percentile ranking from the NSLDS sample, which shows that there is a wide range of possibilities. For a field ranked in the 50<sup>th</sup> percentile by the Title IV earnings outcomes, the true rank based on all graduates could be anywhere from 40<sup>th</sup> percentile to over 60<sup>th</sup> percentile.

**Figure 10: Comparison of Rankings by Field, within School**



A similar story is shown in Figure 7, which compares schools by program. I find similarly variable results to Figure 6, and Panel B shows that the distribution is even wider for this ranking, suggesting that there is substantial uncertainty about the true ranking, given the ranking from the NSLDS sample. In results not disclosed, I also did these graphs with rankings of earnings 10 years after graduation, and the results were very similar, although the bands in Panel B are slightly wider, suggesting even more uncertainty.

**Figure 11: Comparison of Rankings by School, within Program**



Overall, these results show that outcomes for Title IV students under-estimate longer-run earnings outcomes for graduates, while early-career outcomes appear to be accurately measured.

#### IV. Conclusions

Earnings and employment outcomes for graduates remain an important piece of information for policymakers, students, and parents as they consider what program or institution to enroll in. In the past few years, two such major efforts have occurred, Post-Secondary Employment Outcomes and College Scorecard. While College Scorecard has more complete coverage of institutions, PSEO publishes earnings outcomes for all graduates, rather than just Title IV recipients. Understanding how the differences in the frame affect the published results is very important in providing context to these numbers.

Both of these products attempt to measure earnings outcomes for graduates, but have differences in the students included in the frame. The goal of this paper is to measure how different earnings outcomes are for Title IV graduates relative to all graduates, which is a key difference between PSEO and College Scorecard. I show that in the average program in my sample, 60% of the graduates have received Title IV aid. I also show that initial earnings are very similar between the samples. At the program level, lower Title IV coverage is associated with more divergence in outcomes between the samples. Finally, I show that these differences in earnings cause programs to change rankings, such that for a given median program for College Scorecard, the true ranking – based on outcomes from all graduates – may be 10 percentile points higher or lower.

This paper has two main takeaways. On average, the results released from College Scorecard for the first year after graduation are comparable to the outcomes for the entire population of graduates. However, over time, these earnings outcomes diverge significantly, meaning that long-run earnings outcomes for Title IV students are significantly lower than non-Title IV students. This is not a new finding, but more work needs to be done on the causes that underlie that lower earnings growth for Title IV graduates.



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